QUARTERLY MONITORING SUMMARY REPORT
HUMBOLDT COUNTY
DEPARTMENT OF PUBLIC WORKS
LOLETA MAINTENANCE STATION
75 HOOKTON CEMETERY ROAD
LOLETA, CALIFORNIA
APN 308-261-04
NCRWQCB CASE # 1THU124

April 2006

Prepared for:

Mr. Chris Whitworth
Humboldt County Department of Public Works
1106 Second Street
Eureka, California 95501

Prepared by:

Winzler & Kelly Consulting Engineers
633 Third Street
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Prepared for:

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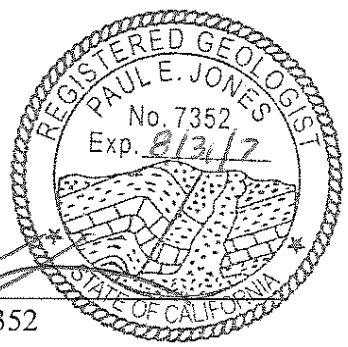
Prepared by:

Lia Webb
Staff Scientist

Reviewed by:



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April 2006

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APPENDICES

1.0 INTRODUCTION

This report presents quarterly groundwater monitoring data collected in October 2005, performed on behalf of the Humboldt County Department of Public Works (HCDPW) regarding the Loleta Maintenance Station, located at 75 Hookton Cemetery Road (APN 308-261-004) in Loleta, California. This report also evaluates cumulative groundwater monitoring data and provides recommendations for additional tasks required to proceed toward environmental regulatory site closure. Quarterly groundwater monitoring activities were performed in accordance with an August 2003 *Workplan for Subsurface Investigation* (Workplan), prepared by Winzler & Kelly as approved by the North Coast Regional Water Quality Control Board (NCRWQCB) in a letter dated August 15, 2004 (Appendix A).

All figures and tables / charts referred to herein are included in Appendix B and C, respectively. Standard Operating Procedures (SOPs) are included in Appendix D, Field Notes are included in Appendix E, laboratory analytical reports are included in Appendix F, and charts are included in Appendix G.

2.0 QUARTERLY MONITORING ACTIVITIES

On October 10, 2005, a Winzler & Kelly technician obtained water levels from monitoring wells (MW-1, MW-2, and MW-3), three of the four piezometers (PW-3, PW-5, and PW-7), and the domestic well (PW-6) in order to calculate groundwater gradient. On October 11, 2005, groundwater samples were collected from monitoring wells (MW-1, MW-2, and MW-3) and from domestic water well PW-6. Site vicinity and monitoring well locations are shown on Figures 1 and 2, respectively (Appendix B). Cumulative well gaging data, groundwater gradient calculations, dissolved oxygen measurements, and sample results are presented in Tables 1, 2, 3, and 4, respectively (Appendix C).

2.1 Groundwater Gradient

On October 10, 2005, water levels were measured in monitoring wells MW-1, MW-2, and MW-3, piezometers PW-3, PW-5, and PW-7, and domestic well PW-6. Cumulative water level measurement data are presented in Table 1. Prior to water level measurements, each well was opened for at least 15 minutes to allow water level stabilization. In October 2005, the groundwater was determined to flow towards the east at approximately 87 degrees azimuth; the groundwater gradient was calculated to be 0.94 feet per 100 feet (Figure 2). Table 2 summarizes cumulative calculations of groundwater gradient and direction. Depth to water data for the October 2005 sampling event were submitted electronically to the State Water Resources Control Board Geotracker System on March 1, 2006.

2.2 Dissolved Oxygen

Dissolved oxygen (DO) concentrations were field-measured using a down-hole dissolved oxygen probe. The DO measurements were recorded prior to well purging and sampling activities. The DO measurements for each well are summarized in Table 3 (Appendix B). Concentrations of DO appear to be naturally low in site groundwater, with groundwater at most of the monitoring wells

during most sampling events exhibiting depleted DO with respect to the concentrations required to support aerobic natural attenuation processes

2.3 Well Purging

Each monitoring well was purged prior to sampling to ensure the collection of representative water samples. A minimum of three wetted casing volumes of groundwater was removed from each well prior to sampling, except when sampling the domestic well (PW-6). Because the domestic well is pumped routinely for supply, it does not require purging. Temperature, pH, and conductivity parameters were monitored during purging to help determine when the well water reached equilibrium. Water level in monitoring wells had recharged to within 80% of their pre-purge levels before sampling. The wells were purged and sampled according to Winzler & Kelly *Monitoring Well Purging and Sampling Activities* SOPs (see Appendix D). Field notes prepared during well purging and gaging are contained in Appendix E.

2.4 Water Sampling

Winzler & Kelly obtained water samples for laboratory analysis from monitoring wells MW-1, MW-2, and MW-3, and domestic well PW-6 during the October 11, 2005 sampling event. The samples were immediately capped, labeled, stored in an iced cooler, and delivered to a State-certified analytical laboratory under proper Chain-of-Custody documentation.

As part of the quarterly groundwater monitoring program, groundwater samples collected from the site monitoring wells were analyzed for the following constituents:

- Total Petroleum Hydrocarbons as Gasoline (TPH-G); benzene, toluene, ethylbezene, and total xylenes (BTEX); and methyl tertiary butyl ether (MTBE) by EPA Method 8021B
- TPH as Diesel (TPH-D) by EPA Method 3510

2.5 Disposition of Wastewater and Soil

Purged water from each monitoring well is contained in labeled 55-gallon drums secured on-site. It is recommended that drummed purge water from monitoring wells MW-1 be dispersed onsite by spray irrigation in a manner so as not to cause erosion or runoff. Purge water from monitoring wells MW-2 and MW-3 is stored on site pending disposal arrangements.

2.6 Groundwater Analytical Results

Concentrations of diesel and gasoline range hydrocarbons and the BTEX constituents have been consistently detected in groundwater samples collected from monitoring well MW-2. During the October 2005 sampling event, the groundwater sample collected from MW-2 contained TPH-G at 720 parts per billion (ppb), TPH-D at 630 ppb, and all of the BTEX constituents at concentrations up to 24 ppb. Concentrations of all tested constituents were below laboratory detection limits in all other samples collected during the October 2005 groundwater monitoring event. Groundwater Analytical Results, along with previous monitoring results, are presented in Table 4 (Appendix C). Copies of the laboratory analytical reports and chain-of-custody documents are contained in Appendix F. Laboratory analytical results for the October 2005 sampling event were submitted electronically to the State Water Resources Control Board Geotracker system on March 1, 2006.

2.7 Quality Assurance/Quality Control (QA/QC)

QA/QC for field activities is provided by adherence to the Winzler & Kelly Standard Operating Procedures (Appendix D). A Travel Blank was used to verify that no cross contamination of samples occurred during handling, storage, or shipping of the samples. The laboratory did not analyze the travel blank since at least one sample was below the detection limit for all analytes. Laboratory QA/QC was provided by lab analysis of a Method Blank, which is used to exclude false-positive analysis, and Laboratory Control Spikes and Duplicates (LCS and LCSD), which evaluate the percentage recovery of known analyte spikes. The recoveries were within acceptable limits for all analytes being tested. The percentage difference (% RPD) between the LCS and the LCSD were also within acceptable limits. The Method Blanks for these analytical runs were non-detect at or above laboratory detection limits for all constituents, although toluene and xylenes were detected below laboratory quantitation limits.

The laboratory provided the following comments regarding the analyses performed:

TPH as Diesel:

- Sample MW-2 contains material lighter than diesel. However, some of this material extends into the diesel range of molecular weights. This sample also contains material similar to degraded or weathered diesel oil.

TPH as Gasoline:

- Sample MW-2 appears to be similar to gasoline but certain peak ratios are not that of a fresh gasoline standard. The reported result represents the amount of material in the gasoline range.
- Some reporting limits were raised for sample MW-2 due to matrix interference.

3.0 QUARTERLY MONITORING PROGRAM SUMMARY

3.1 Groundwater Gradient

Groundwater gradient has been calculated, based on monthly water level measurements. Since October 2001, groundwater flow direction below the site has ranged from northerly (0 degrees) to southerly (175.53 degrees) with a gradient ranging from 0.31 foot per 100 feet to 3.31 feet per 100 feet. Average gradient direction is east northeasterly at 76 degrees azimuth with a magnitude of 2.39 feet per 100 feet. The presence of an active domestic water supply well onsite (PW-6) near the former UST excavation has affected many of the groundwater gradient calculations to varying degrees. Influence of active pumping at well PW-6 has previously produced occasional radial groundwater contour maps, indicating groundwater flow towards well PW-6 from all directions. The effect of active pumping at well PW-6 on the other groundwater gradient calculations is uncertain.

The absence of impacted groundwater northeast of the former USTs (well PW-6) and the historic low concentration detection of TPH-G at piezometer PW-4 (converted to monitoring well MW-3) indicate a more northerly direction of plume migration (see section 3.3). A northerly direction of plume migration is more consistent with the observed distribution of impacted groundwater than the calculated groundwater flow direction, which indicates an east northeasterly direction of plume migration. While none of the tested constituents have been detected at the nearest down-gradient monitoring point (piezometer PW-6), approximately 35

feet northeast of monitoring well MW-2, TPH-G was detected at a very low concentration approximately 70 feet north of monitoring well MW-2 at piezometer PW-4. Since converting this sampling location to monitoring well MW-3, concentrations of all tested constituents have remained below laboratory detection limits except for one detection of TPH-D at a concentration of 160 ppb during July 2005. A northerly direction of plume migration appears to be the more plausible, considering the relatively high concentrations of petroleum constituents detected at monitoring well MW-2.

3.2 Constituents Present

Impacts to soil and groundwater at this site were caused by a release from USTs formerly containing diesel and gasoline. The contaminants of concern at this site are:

- Total Petroleum Hydrocarbons as Gasoline (TPH-G)
- Total Petroleum Hydrocarbons as Diesel (TPH-D)
- Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX)

No free-phase floating petroleum product has been observed in any of the monitoring wells or piezometers. Concentrations of TPH-G up to 1,500 ppb and TPH-D up to 740 ppb with attendant concentrations of BTEX are present in the immediate vicinity of the former UST excavation.

3.3 Extent of Impacted Groundwater

Recalcitrant concentrations of TPH-D, TPH-G, and BTEX have been detected only in groundwater samples collected from monitoring well MW-2. Concentrations of all tested constituents have remained below or rarely near laboratory detection limits in quarterly groundwater samples collected from monitoring wells MW-1 and MW-3. TPH-D, TPH-G, and BTEX have been detected in groundwater in the vicinity of the former UST location and, presumably, in a plume of dissolved phase petroleum hydrocarbon contamination extending in a northerly direction, indicated by results from monitoring wells MW-2 and MW-3. TPH-G TPH-D are the only tested constituents detected at any sampling point down –gradient from monitoring well MW-2 (detected historically at piezometer PW-4 – now MW-3). The presence of a plume of impacted groundwater down gradient from monitoring well MW-2 is likely due to the relatively high concentrations of gasoline and diesel range constituents detected at MW-2. The routine absence of the tested constituents in groundwater at monitoring well MW-3 (converted from piezometer PW-4) suggests that the plume of dissolved phase hydrocarbons is limited in extent and does not appear to be migrating. The rare detections of TPH-D and TPH-G at MW-3 suggests that it represents the margin of the plume.

The extent of impacted groundwater detected at monitoring well MW-2 is defined within 35 feet in a northeasterly direction by domestic well PW-6 (potentially down-gradient), within 70 feet in a northerly direction by monitoring well MW-3 (most likely down-gradient), within 10 feet in an easterly direction by monitoring well MW-1, within 70 feet in a southerly direction by piezometer PW-7, and within 80 feet in a west southwesterly direction by piezometer PW-3. Table 3 presents cumulative laboratory analytical results for groundwater samples collected from groundwater monitoring wells and piezometers since they were constructed in 1990.

3.4 Trends in Contaminant Concentrations

Throughout the groundwater monitoring program, TPH-G, TPH-D, and the BTEX constituents have been consistently detected only in groundwater samples collected from monitoring well MW-2. Concentrations of TPH-D and TPH-G have fluctuated over time, but do not show a clear pattern of increasing or decreasing. Concentrations of the BTEX constituents show a trend toward declining concentrations over time.

The presence of impacted groundwater at monitoring well MW-2 indicates that some migration of impacted groundwater has occurred and presumably, is still occurring. Chart 1 (Appendix C) shows fluctuations in TPH-G and TPH-D concentrations detected at the only impacted monitoring well (MW-2). Chart 1 indicates that changes in contaminant concentrations do not correlate well with seasonal changes in water table elevation. Chart 1 also indicates that changes in water table elevation do not correlate well with an expected pattern of increasing elevation during the rainy season and decreasing elevation during the dry season. The absence of a correlation between higher water table elevations during the rainy season is most likely a result of the affects of pumping at nearby domestic water well PW-6. Concentrations of the BTEX constituents in groundwater at MW-2 show a declining trend over time. Sample results for benzene show the most pronounced declining trend as shown on Chart 2 (Appendix C). The absence of detectable concentrations of any of the tested constituents down-gradient from MW-2 suggests that the observed declines in BTEX concentrations are most likely the result of natural attenuation processes and not migration.

The distribution of contaminant concentrations peripheral to monitoring well MW-2 indicates that the core of the plume is not migrating significantly. The shallow Hookton Formation aquifer below the site is composed of sandy, poorly consolidated sediments that have the potential to promote rapid migration. Despite the potential for rapid plume migration, it appears that either the relatively low hydraulic gradient is restricting the rate of migration or that the natural attenuation of dissolved phase petroleum constituents is outpacing the rate of migration.

4.0 CONCLUSIONS

- Quarterly groundwater gradient calculations indicate that groundwater gradient and flow direction are affected by pumping water from the onsite domestic water supply well. Although calculated groundwater flow direction is in an easterly direction, the distribution of impacted groundwater indicates a more northerly direction of plume migration. Groundwater gradient at the site has ranged from 0.31 foot per 100 feet to 13.97 feet per 100 feet. Groundwater flow direction has ranged from 0 degrees azimuth to 175.53 degrees azimuth.

- The groundwater samples collected from monitoring well MW-2 contained detectable concentrations of TPH-G, TPH-D, and BTEX. Concentrations of TPH-D, TPH-G, and benzene have been consistently detected above the numerical water quality objectives for protection of potential beneficial use of groundwater as domestic water supply. Concentrations of gasoline and diesel range hydrocarbons detected in groundwater samples collected from MW-2 do not show a pattern of increasing or decreasing over

time. Except for one low concentration detection of TPH-D at MW-3 in July 2005, concentrations of all tested constituents in all other samples were below laboratory detection limits during the last hydrologic cycle.
- The extent of impacted groundwater has been defined and is restricted to within 70 feet north of the former location of the USTs and within shorter distances in other directions.

5.0 RECOMMENDATIONS

Based on the data presented in this report, Winzler & Kelly recommends the following:

- To proceed toward environmental regulatory site closure, a corrective action plan (CAP) is currently being prepared to evaluate alternatives for remediation of recalcitrant concentrations of gasoline and diesel range hydrocarbons detected in groundwater samples collected from monitoring well MW-2. The CAP will be finalized to include the results from groundwater monitoring as summarized in this report. Preparation of the CAP has been approved by the NCRWQCB in an electronic message dated December 6, 2004.
- Quarterly groundwater monitoring program should be continued on a quarterly basis. The scope of continued monitoring should include quarterly groundwater gradient calculations based on water table elevations at all piezometers, monitoring wells, and the domestic well as well as quarterly sampling of monitoring wells MW-1, MW-2, and MW-3 for TPH-D, TPH-G, and BTEX.
- The drummed purge water from monitoring well MW-1 should be disposed of onsite by spray irrigation in a manner so as not to cause erosion or runoff. Purge water generated from MW-2 and MW-3 will be disposed at an appropriate offsite facility.

6.0 DISTRIBUTION

Copies of this report have been sent to the following:

Mr. Chris Whitworth
Humboldt County Department of Public Works
1106 Second Street
Eureka, CA 95501

Mr. Ron Allen
California Regional Water Quality Control Board
North Coast Region
5550 Skylane Boulevard, Suite A
Santa Rosa, CA 95403

Appendix A
Correspondence

California Regional Water Quality Control Board

North Coast Region

William R. Massey, Chairman

Winston H. Hickox
Secretary for Environmental Protection

Internet Address: http://www.swrcb.ca.gov/rwqcb1/
5550 Skylane Boulevard, Suite A, Santa Rosa, California 95403
Phone 1-877-721-9203 Office (707) 576-2220 FAX (707) 523-0135

Gray Davis
Governor

August 15, 2003

Mr. Chris Whitworth
Humboldt County Department of Public Works
1106 Second Street
Eureka, CA 95501

Dear Mr. Whitworth:

Subject: Review of Winzler & Kelly August 2003 Workplan for Subsurface Investigation

File: HCDPW Loleta Maintenance Station, Hookton Cemetery Road, Loleta Humboldt County; Case No. 1THU124

I approve the above workplan, submitted to this office on August 12, 2003. The workplan accurately details the proposed tasks for converting piezometer P-4 into a monitoring well. This conversion will facilitate monitoring of the down-gradient extent of the plume. Because it does not provide useful data, piezometer P-1 shall be destroyed by over-drilling and grouting. Implementation of two years of a quarterly groundwater monitoring program for new and existing wells is also included in the scope of work.

It is understood that, upon commitment of funds from the State Underground Storage Tank Cleanup Fund, Winzler & Kelly will begin implementation of the field work. The projected starting date for the field work is February 2004.

Please notify this office seven days in advance of the start of field work. Upon completion of field work, please submit a report of your findings to this office no later than March 31, 2004.

If you have any questions concerning this matter please contact me at (707) 576-2848 or via email: aller@rb1.swrcb.ca.gov.

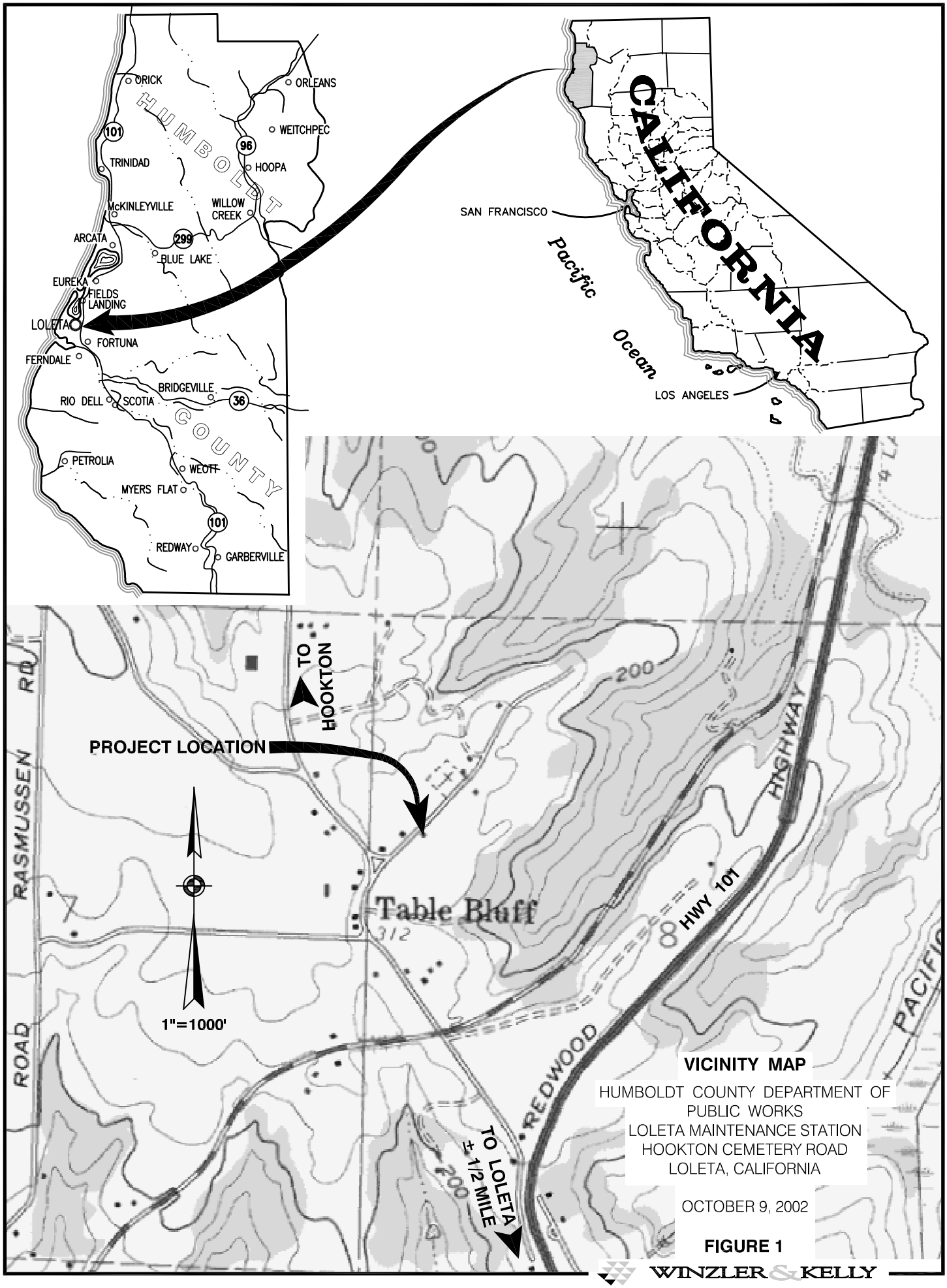
Sincerely,

Ron Allen
Environmental Scientist

RRA:tmk/HCDPW Loleta AUG03WP.doc

cc: Mr. James Clark, Humboldt County Health Department, 100 H Street, Suite 100, Eureka, CA 95501
Mr. Paul Jones, Winzler & Kelly Consulting Engineers 633 Third Street, Eureka, CA 95501-0417

Appendix B
Figures



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VICINITY MAP

HUMBOLDT COUNTY DEPARTMENT OF PUBLIC WORKS
LOLETA MAINTENANCE STATION
HOOKTON CEMETERY ROAD
LOLETA, CALIFORNIA

OCTOBER 9, 2002

FIGURE 1

WINZLER & KELLY

This Figure is Based On A Site Plan Prepared by the HCDPW and Is Not A Product of Survey by Winzler & Kelly

GROUNDWATER FLOW DIRECTION = 87.20° Az.
0.94 FT./100 FT.
OCTOBER 10, 2005

MATERIALS STORAGE AREA

CHAIN LINK FENCE

SCALE: 1"=50'

MW-3 (305.06)

(E) RESIDENCES

Maintenance Building

PW-2

MW-2 (302.52)

PW-6 (303.37)

(E) WELL & HOUSE

MW-1 (302.60)

PW-3 304.05

PW-5 (302.58)

PW-7 (303.33)

FORMER UNDERGROUND STORAGE TANKS

FORMER PW-1

HOOKTON CEMETERY ROAD

(E) ABOVE GROUND STORAGE TANKS

Legend

MW-1 ⊕	Groundwater Monitoring Well
PW-1 ◉	Groundwater Piezometer
—302—	Groundwater Contour (feet)

GROUNDWATER GRADIENT (OCTOBER 2005)

HUMBOLDT COUNTY DEPARTMENT OF PUBLIC WORKS
LOLETA MAINTENANCE STATION
75 HOOKTON CEMETERY ROAD
LOLETA, CALIFORNIA

FIGURE 2

WINZLER & KELLY

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Appendix C
Tables and Charts

TABLE 1
GROUNDWATER MEASUREMENTS
Humboldt County Department of Public Works
Loleta Maintenance Station
NCRWQCB Case #1THU124

Well Number	Date	Relative Groundwater Elevation (ft)	Top of Casing (ft)	A Depth to Water (ft)	B Depth to Product (ft)	(A-B=C) Product Thickness (ft)	D Correction Factor (C x 0.729*)	A-D Equivalent Depth to Water (ft)
MW-1	4-Oct-01	-	312.99	Inaccessible	-	-	-	-
	30-Nov-01	301.91	312.99	11.08	None	0.00	0.00	11.08
	28-Dec-01	302.54	312.99	10.45	None	0.00	0.00	10.45
	24-Jan-02	304.04	312.99	8.95	None	0.00	0.00	8.95
	15-Feb-02	304.55	312.99	8.44	None	0.00	0.00	8.44
	16-Mar-02	306.12	312.99	6.87	None	0.00	0.00	6.87
	19-Apr-02	304.53	312.99	8.46	None	0.00	0.00	8.46
	25-May-02	303.86	312.99	9.13	None	0.00	0.00	9.13
	17-Jun-02	303.30	312.99	9.69	None	0.00	0.00	9.69
	30-Jul-02	302.60	312.99	10.39	None	0.00	0.00	12.31
	8-Aug-02	302.46	312.99	10.53	None	0.00	0.00	10.53
	11-Sep-02	302.02	312.99	10.97	None	0.00	0.00	10.97
	9-Oct-02	301.54	312.99	11.45	None	0.00	0.00	11.45
	6-Nov-03	301.62	312.99	11.37	None	0.00	0.00	11.37
	27-Apr-04	304.53	312.99	8.46	None	0.00	0.00	12.31
	19-Jul-04	302.90	312.99	10.09	None	0.00	0.00	10.09
	11-Oct-04	302.29	312.99	10.70	None	0.00	0.00	10.70
	4-Jan-05	306.22	312.99	6.77	None	0.00	0.00	6.77
	11-Apr-05	307.28	312.99	5.71	None	0.00	0.00	5.71
	26-Jul-05	303.65	312.99	9.34	None	0.00	0.00	9.34
	10-Oct-05	302.60	312.99	10.39	None	0.00	0.00	10.39
MW-2	4-Oct-01	301.12	312.75	11.63	None	0.00	0.00	11.63
	30-Nov-01	301.68	312.75	11.07	None	0.00	0.00	11.07
	28-Dec-01	302.09	312.75	10.66	None	0.00	0.00	10.66
	24-Jan-02	303.90	312.75	8.85	None	0.00	0.00	8.85
	15-Feb-02	304.42	312.75	8.33	None	0.00	0.00	8.33
	16-Mar-02	306.04	312.75	6.71	None	0.00	0.00	6.71
	19-Apr-02	304.54	312.75	8.21	None	0.00	0.00	8.21
	25-May-02	303.80	312.75	8.95	None	0.00	0.00	8.95
	17-Jun-02	303.20	312.75	9.55	None	0.00	0.00	9.55
	30-Jul-02	302.53	312.75	10.22	None	0.00	0.00	11.75
	8-Aug-02	302.39	312.75	10.36	None	0.00	0.00	10.36
	11-Sep-02	301.97	312.75	10.78	None	0.00	0.00	10.78
	9-Oct-02	301.49	312.75	11.26	None	0.00	0.00	11.26
	6-Nov-03	301.56	312.75	11.19	None	0.00	0.00	11.19
	27-Apr-04	304.43	312.75	8.32	None	0.00	0.00	8.32
	19-Jul-04	302.82	312.75	9.93	None	0.00	0.00	9.93
	11-Oct-04	302.17	312.75	10.58	None	0.00	0.00	10.58
	4-Jan-05	306.01	312.75	6.74	None	0.00	0.00	6.74
	11-Apr-05	307.16	312.75	5.59	None	0.00	0.00	5.59
	26-Jul-05	303.56	312.75	9.19	None	0.00	0.00	9.19
	10-Oct-05	302.52	312.75	10.23	None	0.00	0.00	10.23
MW-3	6-Nov-03	304.35	317.33	12.98	None	0.00	0.00	12.98
	27-Apr-04	307.12	317.33	10.21	None	0.00	0.00	10.21
	19-Jul-04	305.48	317.33	11.85	None	0.00	0.00	11.85
	11-Oct-04	304.63	317.33	12.70	None	0.00	0.00	12.70
	4-Jan-05	308.46	317.33	8.87	None	0.00	0.00	8.87
	11-Apr-05	310.45	317.33	6.88	None	0.00	0.00	6.88
	26-Jul-05	306.12	317.33	11.21	None	0.00	0.00	11.21
	10-Oct-05	305.06	317.33	12.27	None	0.00	0.00	12.27
PW-1	4-Oct-01	256.78	315.28	58.50	None	0.00	0.00	58.50
	30-Nov-01	257.83	315.28	57.45	None	0.00	0.00	57.45
	28-Dec-01	257.92	315.28	57.36	None	0.00	0.00	57.36
	24-Jan-02	257.78	315.28	57.50	None	0.00	0.00	57.50
	15-Feb-02	257.85	315.28	57.43	None	0.00	0.00	57.43
	16-Mar-02	258.09	315.28	57.19	None	0.00	0.00	57.19
	19-Apr-02	-	315.28	dry	None	0.00	0.00	-
	25-May-02	258.41	315.28	56.87	None	0.00	0.00	56.87
	17-Jun-02	258.44	315.28	56.84	None	0.00	0.00	56.84
	30-Jul-02	257.44	315.28	57.84	None	0.00	0.00	57.84
	8-Aug-02	258.42	315.28	56.86	None	0.00	0.00	56.86
	11-Sep-02	258.35	315.28	56.93	None	0.00	0.00	56.93
	9-Oct-02	-	315.28	NA	None	0.00	0.00	-
	7-Nov-03	*** Abandoned ***						
PW-2	4-Oct-01	301.11	313.86	12.75	None	0.00	0.00	12.75

TABLE 1
GROUNDWATER MEASUREMENTS
Humboldt County Department of Public Works
Loleta Maintenance Station
NCRWQCB Case #1THU124

Well Number	Date	Relative Groundwater Elevation (ft)	Top of Casing (ft)	A Depth to Water (ft)	B Depth to Product (ft)	(A-B=C) Product Thickness (ft)	D Correction Factor (C x 0.729*)	A-D Equivalent Depth to Water (ft)
	30-Nov-01	301.48	313.86	12.38	None	0.00	0.00	12.38
	28-Dec-01	303.21	313.86	10.65	None	0.00	0.00	10.65
	24-Jan-02	303.56	313.86	10.30	None	0.00	0.00	10.30
	15-Feb-02	303.89	313.86	9.97	None	0.00	0.00	9.97
	16-Mar-02	305.03	313.86	8.83	None	0.00	0.00	8.83
	19-Apr-02	303.97	313.86	9.89	None	0.00	0.00	9.89
	25-May-02	303.49	313.86	10.37	None	0.00	0.00	10.37
	17-Jun-02	303.08	313.86	10.78	None	0.00	0.00	10.78
	30-Jul-02	302.49	313.86	11.37	None	0.00	0.00	11.31
	8-Aug-02	302.39	313.86	11.47	None	0.00	0.00	11.47
	11-Sep-02	301.96	313.86	11.90	None	0.00	0.00	11.90
	9-Oct-02	-	313.86	NA	None	0.00	0.00	-
	6-Nov-03	301.65	313.86	12.21	None	0.00	0.00	12.21
	27-Apr-04	304.12	313.86	9.74	None	0.00	0.00	11.31
	19-Jul-04	302.76	313.86	11.10	None	0.00	0.00	11.10
	11-Oct-04	301.79	313.86	12.07	None	0.00	0.00	12.07
	4-Jan-05	304.51	313.86	9.35	None	0.00	0.00	9.35
	11-Apr-05	306.20	313.86	7.66	None	0.00	0.00	7.66
	26-Jul-05	303.38	313.86	10.48	None	0.00	0.00	10.48
	10-Oct-05	-	313.86	-	None	0.00	0.00	-
PW-3	4-Oct-01	301.82	311.17	9.35	None	0.00	0.00	9.35
	30-Nov-01	302.82	311.17	8.35	None	0.00	0.00	8.35
	28-Dec-01	304.41	311.17	6.76	None	0.00	0.00	6.76
	24-Jan-02	304.67	311.17	6.50	None	0.00	0.00	6.50
	15-Feb-02	305.02	311.17	6.15	None	0.00	0.00	6.15
	16-Mar-02	306.58	311.17	4.59	None	0.00	0.00	4.59
	19-Apr-02	302.75	311.17	8.42	None	0.00	0.00	8.42
	25-May-02	304.50	311.17	6.67	None	0.00	0.00	6.67
	17-Jun-02	304.06	311.17	7.11	None	0.00	0.00	7.11
	30-Jul-02	302.28	311.17	8.89	None	0.00	0.00	8.89
	8-Aug-02	303.01	311.17	8.16	None	0.00	0.00	8.16
	11-Sep-02	302.52	311.17	8.65	None	0.00	0.00	8.65
	9-Oct-02	302.03	311.17	9.14	None	0.00	0.00	9.14
	6-Nov-03	-	311.17	Inacccessible	-	-	-	-
	27-Apr-04	-	311.17	Inaccessible	-	-	-	-
	19-Jul-04	NA						
	11-Oct-04	NA						
	11-Apr-05	306.93	311.17	4.24	None	0.00	0.00	4.24
	26-Jul-05	NA						
	10-Oct-05	304.05	311.17	7.12	None	0.00	0.00	7.12
PW-4	4-Oct-01	-	314.08	Inaccessible	-	-	-	-
	30-Nov-01	300.95	314.06	13.11	None	0.00	0.00	13.11
	28-Dec-01	302.84	314.06	11.22	None	0.00	0.00	11.22
	24-Jan-02	302.46	314.06	11.60	None	0.00	0.00	11.60
	15-Feb-02	304.06	314.06	10.00	None	0.00	0.00	10.00
	16-Mar-02	305.91	314.06	8.15	None	0.00	0.00	8.15
	19-Apr-02	304.23	314.06	9.83	None	0.00	0.00	9.83
	25-May-02	303.32	314.06	10.74	None	0.00	0.00	10.74
	17-Jun-02	302.79	314.06	11.27	None	0.00	0.00	11.27
	30-Jul-02	301.16	314.06	12.90	None	0.00	0.00	12.90
	8-Aug-02	302.02	314.06	12.04	None	0.00	0.00	12.04
	11-Sep-02	301.56	314.06	12.50	None	0.00	0.00	12.50
	9-Oct-02	301.12	314.06	12.94	None	0.00	0.00	12.94
	7-Nov-03	*** Converted to MW-3 ***						
PW-5	4-Oct-01	301.80	314.45	12.65	None	0.00	0.00	12.65
	30-Nov-01	301.60	314.45	12.85	None	0.00	0.00	12.85
	28-Dec-01	303.27	314.45	11.18	None	0.00	0.00	11.18
	24-Jan-02	302.75	314.45	11.70	None	0.00	0.00	11.70
	15-Feb-02	303.31	314.45	11.14	None	0.00	0.00	11.14
	16-Mar-02	303.92	314.45	10.53	None	0.00	0.00	10.53
	19-Apr-02	303.03	314.45	11.42	None	0.00	0.00	11.42
	25-May-02	302.78	314.45	11.67	None	0.00	0.00	11.67
	17-Jun-02	302.64	314.45	11.81	None	0.00	0.00	11.81
	30-Jul-02	302.40	314.45	12.05	None	0.00	0.00	12.05
	8-Aug-02	302.25	314.45	12.20	None	0.00	0.00	12.20

TABLE 1
GROUNDWATER MEASUREMENTS
Humboldt County Department of Public Works
Loleta Maintenance Station
NCRWQCB Case #1THU124

Well Number	Date	Relative Groundwater Elevation (ft)	Top of Casing (ft)	A Depth to Water (ft)	B Depth to Product (ft)	(A-B=C) Product Thickness (ft)	D Correction Factor (C x 0.729*)	A-D Equivalent Depth to Water (ft)
	11-Sep-02	302.01	314.45	12.44	None	0.00	0.00	12.44
	9-Oct-02	301.80	314.45	12.65	None	0.00	0.00	12.65
	6-Nov-03	301.55	314.45	12.90	None	0.00	0.00	12.90
	27-Apr-04	302.22	314.45	12.23	None	0.00	0.00	12.23
	19-Jul-04	302.13	314.45	12.32	None	0.00	0.00	12.32
	11-Oct-04	301.97	314.45	12.48	None	0.00	0.00	12.48
	4-Jan-05	303.18	314.45	11.27	None	0.00	0.00	11.27
	11-Apr-05	303.73	314.45	10.72	None	0.00	0.00	10.72
	26-Jul-05	303.02	314.45	11.43	None	0.00	0.00	11.43
	10-Oct-05	302.58	314.45	11.87	None	0.00	0.00	11.87
PW-6	4-Oct-01	-	315.65	Inaccessible	-	-	-	-
	30-Nov-01	302.45	315.65	13.20	None	0.00	0.00	13.20
	28-Dec-01	296.75	315.65	18.90	None	0.00	0.00	18.90
	24-Jan-02	304.45	315.65	11.20	None	0.00	0.00	11.20
	15-Feb-02	-	315.65	-	None	0.00	0.00	-
	16-Mar-02	306.73	315.65	8.92	None	0.00	0.00	8.92
	19-Apr-02	-	315.65	-	None	0.00	0.00	-
	25-May-02	-	315.65	NA	None	0.00	0.00	-
	17-Jun-02	-	315.65	NA	None	0.00	0.00	-
	30-Jul-02	304.32	315.65	11.33	None	0.00	0.00	11.33
	8-Aug-02	-	315.65	NA	None	0.00	0.00	-
	11-Sep-02	-	315.65	NA	None	0.00	0.00	-
	9-Oct-02	302.35	315.65	13.30	None	0.00	0.00	13.30
	6-Nov-03	302.48	315.65	13.17	None	0.00	0.00	13.17
	27-Apr-04	305.28	315.65	10.37	None	0.00	0.00	10.37
	19-Jul-04	303.72	315.65	11.93	None	0.00	0.00	11.93
	11-Oct-04	303.02	315.65	12.63	None	0.00	0.00	12.63
	4-Jan-05	306.74	315.65	8.91	None	0.00	0.00	8.91
	11-Apr-05	307.78	315.65	7.87	None	0.00	0.00	7.87
	26-Jul-05	304.45	315.65	11.20	None	0.00	0.00	11.20
	10-Oct-05	303.37	315.65	12.28	None	0.00	0.00	12.28
PW-7	4-Oct-01	301.92	315.07	13.15	None	0.00	0.00	13.15
	30-Nov-01	302.82	315.07	12.25	None	0.00	0.00	12.25
	28-Dec-01	304.10	315.07	10.97	None	0.00	0.00	10.97
	24-Jan-02	304.87	315.07	10.20	None	0.00	0.00	10.20
	15-Feb-02	305.42	315.07	9.65	None	0.00	0.00	9.65
	16-Mar-02	307.02	315.07	8.05	None	0.00	0.00	8.05
	19-Apr-02	305.41	315.07	9.66	None	0.00	0.00	9.66
	25-May-02	304.58	315.07	10.49	None	0.00	0.00	10.49
	17-Jun-02	304.03	315.07	11.04	None	0.00	0.00	11.04
	30-Jul-02	302.22	315.07	12.85	None	0.00	0.00	12.85
	8-Aug-02	303.14	315.07	11.93	None	0.00	0.00	11.93
	11-Sep-02	302.69	315.07	12.38	None	0.00	0.00	12.38
	9-Oct-02	302.20	315.07	12.87	None	0.00	0.00	12.87
	6-Nov-03	302.34	315.07	12.73	None	0.00	0.00	12.73
	27-Apr-04	305.30	315.07	9.77	None	0.00	0.00	9.77
	19-Jul-04	303.60	315.07	11.47	None	0.00	0.00	11.47
	11-Oct-04	303.05	315.07	12.02	None	0.00	0.00	12.02
	4-Jan-05	307.39	315.07	7.68	None	0.00	0.00	7.68
	11-Apr-05	308.24	315.07	6.83	None	0.00	0.00	6.83
	26-Jul-05	304.36	315.07	10.71	None	0.00	0.00	10.71
	10-Oct-05	303.33	315.07	11.74	None	0.00	0.00	11.74

*0.729 is the density of gasoline at 15°C as referenced in the API Publication 1628, Second Edition, August 1989

NA = Not Analyzed - = no data

TABLE 2
GROUNDWATER GRADIENT SUMMARY
Humboldt County Department of Public Works
Loleta Maintenance Station
NCRWQCB Case #1THU124

Date	Groundwater Flow Direction	Gradient Direction (degrees Azimuth)	Gradient Magnitude (ft./100 ft.)
4-Oct-01	N	0	0.76
30-Nov-01	N-NE	24	1.82
28-Dec-01	N	0	*
24-Jan-02	N	1	1.81
15-Feb-02	E	79	3.31
16-Mar-02	E	90	2.22
19-Apr-02	N-NE	30	0.66
25-May-02	S	171.3	13.97
25-May-02**	N-NE	26.5	0.95
17-Jun-02	S	171.7	13.77
07-Jun-02 **	N-NE	26	0.81
30-Jul-02	--	***	***
8-Aug-02	NE	46.10	0.87
11-Sep-02	NE	37.12	0.84
9-Oct-02	NE	38.72	0.31
6-Nov-03	SE	122.17	0.61
28-Apr-04	E- SE	110.51	0.82
19-Jul-04	SE	116.57	0.66
11-Oct-04	E	96.40	0.75
4-Jan-05	E	79.70	1.52
11-Apr-05	S-SE	148.21	0.77
26-Jul-05	S	175.53	0.53
10-Oct-05	E	87.20	0.94
AVERAGE	**E-NE**	**76.26**	**2.39**

* 12/28/01 gradient magnitude not calculated due to influence of active pumping from domestic well P-6
** Gradient re-calculated graphically for gradient contours only in immediate vicinity of UST
*** 7/30/02 gradient not calculated due to radial flow away from P-6 such that gradient varies considerably depending on location

TABLE 3
DISSOLVED OXYGEN
Humboldt County Department of Public Works
Loleta Maintenance Station
NCRWQCB Case #1THU124

Date	MW-1	MW-2	MW-3	PW-2	PW-6
9-Oct-02	NA	1.75	NA	1.41	NA
6-Nov-03	4.8	3.5	3.7	NA	4.9
28-Apr-04	3.2	1.3	1.2	NA	2.9
19-Jul-04	3.0	1.2	1.5	NA	3
11-Oct-04	0.8	0.5	1.2	NA	4.1
4-Jan-05	2.0	4.9	3.8	NA	NA
11-Apr-05	4.0	1.7	1.8	NA	0.9
26-Jul-05	1.9	1.8	1.1	NA	3.1
10-Oct-05	2.1	1.4	2.7	NA	NA
NA = Not Analyzed					

TABLE 4 GROUNDWATER ANALYTICAL RESULTS
Humboldt County Department of Public Works
Loleta Maintenance Station
NCRWQCB Case #1THU124

(All units reported in parts per billion)

Well ID	Sample Date	TPH-G	TPH-D	Benzene	Toluene	Ethyl-benzene	Total Xylenes	(MTBE) Methyl Tertiary Butyl Ether	(DIPE) Di-isopropyl Ether	(ETBE) Ethyl Tertiary Butyl Ether	(TAME) Tertiary Amyl Methyl Ether	(TBA) Tertiary Butyl Alcohol	Lead
MW-1	26-Jan-90	ND	170	75	ND	ND	ND	NA	NA	NA	NA	NA	ND
	4-Oct-01	Well Not Accessible - Not Sampled											
	24-Jan-02	<50	<50	<0.50	<0.50	<0.50	<1.00	<1.0	<1.0	<1.0	<1.0	<20	NA
	19-Apr-02	<50	<50	<0.50	<0.50	<0.50	<1.00	<1.0	<1.0	<1.0	<1.00	<20	NA
	30-Jul-02	<50	<50	<0.50	<0.50	<0.50	<1.00	<1.0	<1.0	<1.0	<1.0	<20	NA
	11-Oct-02	66	<50	<0.50	<0.50	<0.50	<1.00	<1.0	<1.0	<1.0	<1.0	<20	NA
	7-Nov-03	<50	<50	<0.50	<0.50	<0.50	<1.00	<3.0	NA	NA	NA	NA	NA
	28-Apr-04	<50	<50	<0.50	<0.50	<0.50	<1.00	<3.0	NA	NA	NA	NA	NA
	19-Jul-04	<50	<50	<0.50	<0.50	<0.50	<1.00	<3.0	NA	NA	NA	NA	NA
	11-Oct-04	<50	<50	<0.50	<0.50	<0.50	<1.00	<3.0	NA	NA	NA	NA	NA
	4-Jan-05	<50	<50	<0.50	<0.50	<0.50	<1.00	<3.0	NA	NA	NA	NA	NA
	12-Apr-05	<50	<50	<0.50	<0.50	<0.50	<1.00	<3.0	NA	NA	NA	NA	NA
	26-Jul-05	<50	<50	<0.50	<0.50	<0.50	<1.00	<3.0	NA	NA	NA	NA	NA
	11-Oct-05	<50	<50	<0.50	<0.50	<0.50	<1.00	<3.0	NA	NA	NA	NA	NA
MW-2	26-Jan-90	470	740	280	15	22	ND	NA	NA	NA	NA	NA	ND
	4-Oct-01	660	570	48	5.6	9.7	17	<1.0	<1.0	<1.0	<1.0	<20	NA
	24-Jan-02	1,500	400	43	18	16	113	<1.0	<1.0	<1.0	<1.0	<20	NA
	19-Apr-02	1,400	740	47	12	12	36	<1.0	<1.0	<1.0	<1.0	<20	NA
	30-Jul-02	970	550	49	9.5	12	17.8	<1.0	<1.0	<1.0	<1.0	<20	NA
	11-Oct-02	790	580	38	5.7	4.2	7.5	<1.0	<1.0	<1.0	<1.0	<20	NA
	7-Nov-03	830	670	42	10	5.7	11.8	<17	NA	NA	NA	NA	NA
	28-Apr-04	740	780	27	10	7.9	14	<16	NA	NA	NA	NA	NA
	19-Jul-04	860	930	32	<12	<7	<5.0	<11	NA	NA	NA	NA	NA
	11-Oct-04	690	630	23	7.8	4.3	7.4	<15	NA	NA	NA	NA	NA
	4-Jan-05	630	510	20	10	6	21.6	<13	NA	NA	NA	NA	NA
	12-Apr-05	760	790	19	9.9	7.4	19.7	<14	NA	NA	NA	NA	NA
	26-Jul-05	800	570	25	9.4	6.7	15.0	<10	NA	NA	NA	NA	NA
	11-Oct-05	720	610	24	9.1	6.4	12.2	<9.0	NA	NA	NA	NA	NA
MW-3	7-Nov-03	<50	<50	<0.50	<0.50	<0.50	<1.00	<3.0	NA	NA	NA	NA	NA
	28-Apr-04	<50	<50	<0.50	<0.50	<0.50	<1.00	<3.0	NA	NA	NA	NA	NA
	19-Jul-04	<50	<50	<0.50	<0.50	<0.50	<1.00	<3.0	NA	NA	NA	NA	NA
	11-Oct-04	<50	<50	<0.50	<0.50	<0.50	<1.00	<3.0	NA	NA	NA	NA	NA
	4-Jan-05	<50	<50	<0.50	<0.50	<0.50	<1.00	<3.0	NA	NA	NA	NA	NA
	12-Apr-05	<50	<50	<0.50	<0.50	<0.50	<1.00	<3.0	NA	NA	NA	NA	NA

TABLE 4 GROUNDWATER ANALYTICAL RESULTS
Humboldt County Department of Public Works
Loleta Maintenance Station
NCRWQCB Case #1THU124

(All units reported in parts per billion)

Well ID	Sample Date	TPH-G	TPH-D	Benzene	Toluene	Ethyl-benzene	Total Xylenes	(MTBE) Methyl Tertiary Butyl Ether	(DIPE) Di-isopropyl Ether	(ETBE) Ethyl Tertiary Butyl Ether	(TAME) Tertiary Amyl Methyl Ether	(TBA) Tertiary Butyl Alcohol	Lead
	26-Jul-05	<50	160	<0.50	<0.50	<0.50	<1.00	<3.0	NA	NA	NA	NA	NA
	11-Oct-05	<50	<50	<0.50	<0.50	<0.50	<1.00	<3.0	NA	NA	NA	NA	NA
PW-1	4-Oct-01	<50	<50	<0.50	<0.50	<0.50	<1.00	<1.0	<1.0	<1.0	<1.0	<20	NA
	7-Nov-03	***Abandoned***											
PW-2	4-Oct-01	<50	<50	<0.50	<0.50	<0.50	<1.00	<1.0	<1.0	<1.0	<1.0	<20	NA
PW-3	4-Oct-01	<50	<50	<0.50	<0.50	<0.50	<1.00	<1.0	<1.0	<1.0	<1.0	<20	NA
PW-4	19-Apr-02	55	<50	<0.50	<0.50	<0.50	<1.00	<1.0	<1.0	<1.0	<1.0	<20	NA
	7-Nov-03	***Converted to MW-3***											
PW-5	4-Oct-01	<50	<50	<0.50	<0.50	<0.50	<1.00	<1.0	<1.0	<1.0	<1.0	<20	NA
PW-6	4-Oct-01	<50	<50	<0.50	<0.50	<0.50	<1.00	<1.0	<1.0	<1.0	<1.0	<20	NA
	24-Jan-02	<50	<50	<0.50	<0.50	<0.50	<1.00	<1.0	<1.0	<1.0	<1.0	<20	NA
	30-Jul-02	<50	<50	<0.50	<0.50	<0.50	<1.00	<1.0	<1.0	<1.0	<1.0	<20	NA
	11-Oct-02	<50	<50	<0.50	<0.50	<0.50	<1.00	<1.0	<1.0	<1.0	<1.0	<20	NA
	7-Nov-03	<50	<50	<0.50	<0.50	<0.50	<1.00	<3.0	NA	NA	NA	NA	NA
	28-Apr-04	<50	<50	<0.50	<0.50	<0.50	<1.00	<3.0	NA	NA	NA	NA	NA
	11-Oct-04	<50	<50	<0.50	<0.50	<0.50	<1.00	<3.0	NA	NA	NA	NA	NA
	20-Jul-04	<50	<50	<0.50	<0.50	<0.50	<1.00	<3.0	NA	NA	NA	NA	NA
	11-Oct-04	<50	<50	<0.50	<0.50	<0.50	<1.00	<3.0	NA	NA	NA	NA	NA
	4-Jan-05	<50	<50	<0.50	<0.50	<0.50	<1.00	<3.0	NA	NA	NA	NA	NA
	12-Apr-05	<50	<50	<0.50	<0.50	<0.50	<1.00	<3.0	NA	NA	NA	NA	NA
	26-Jul-05	<50	<50	<0.50	<0.50	<0.50	<1.00	<3.0	NA	NA	NA	NA	NA
	11-Oct-05	<50	<50	<0.50	<0.50	<0.50	<1.00	<3.0	NA	NA	NA	NA	NA
PW-7	4-Oct-01	<50	<50	<0.50	<0.50	<0.50	<1.00	<1.0	<1.0	<1.0	<1.0	<20	NA
DW-1*	8-Nov-90	ND	ND	ND	ND	ND	ND	NA	NA	NA	NA	NA	ND

<X = Analyte not detected at, or above the detection limit of X.

ND = Analyte not detected above laboratory detection limit (data from June 1999 Problem Assessment Report - Detection Limit Not Reported.

NA = Not Analyzed

* Adjacent Parcel domestic well water collected by SHN.

Chart 1: Comparative TPH-G and TPH-D Concentrations (ppb) in Groundwater at MW-2 With Water Table Elevations

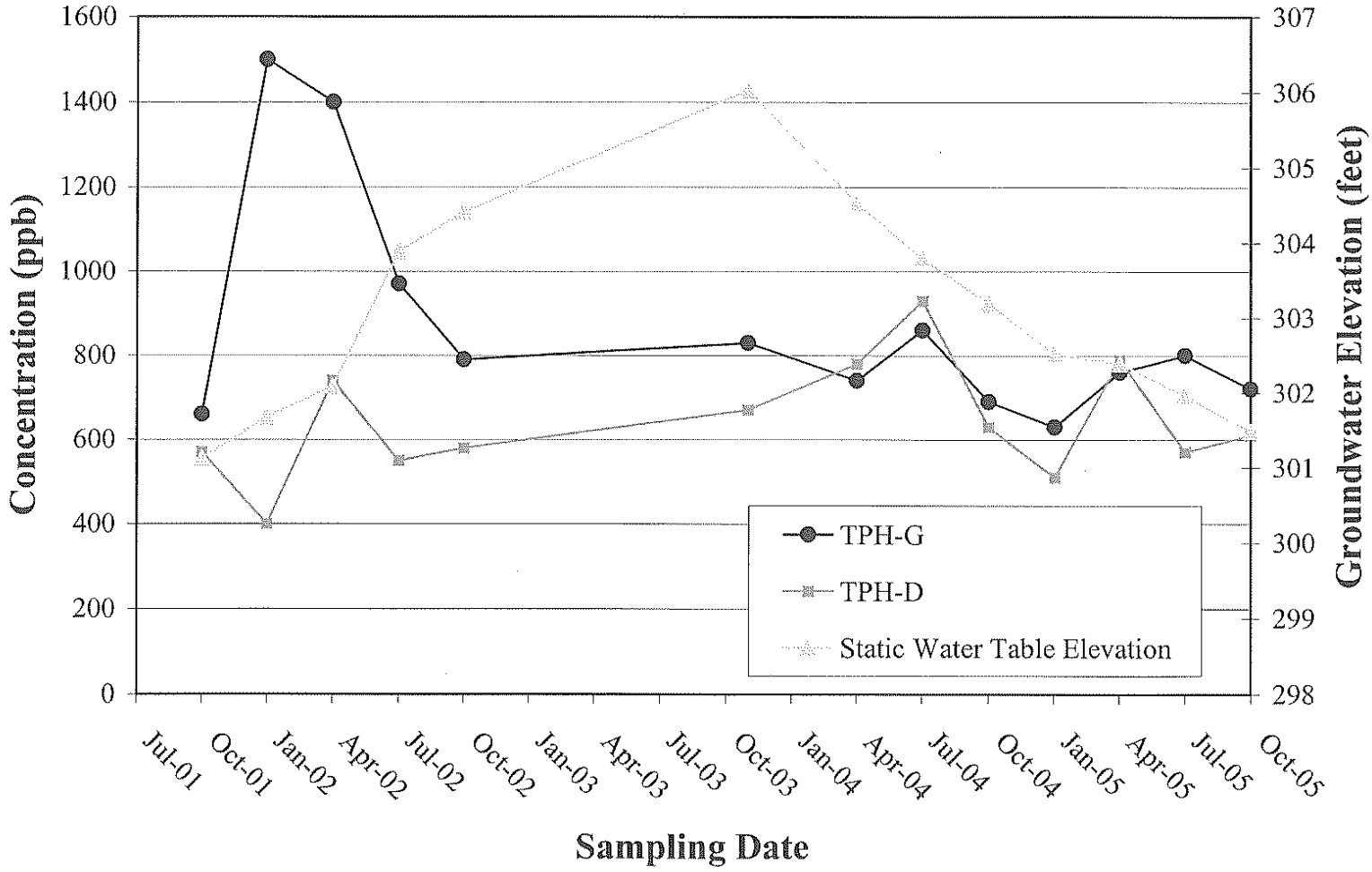
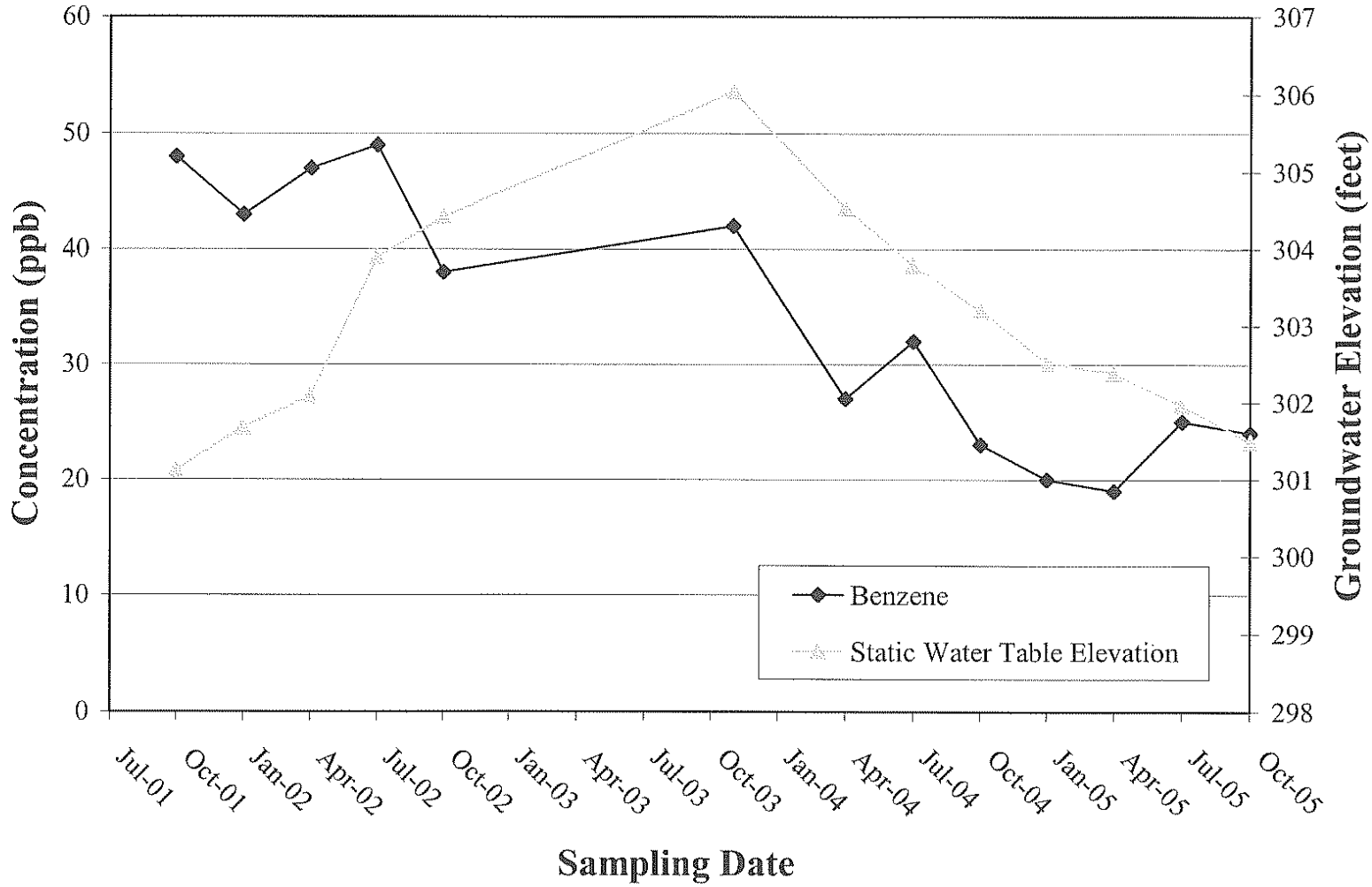


Chart 2: Comparative Benzene Concentrations (ppb) in Groundwater at MW-2 With Water Table Elevations



Appendix D

Winzler & Kelly Standard Operating Procedures (SOPs)

WINZLER & KELLY CONSULTING ENGINEERS

STANDARD OPERATING PROCEDURES
GROUNDWATER LEVEL MEASUREMENTS AND
FREE PHASE HYDROCARBON MEASUREMENTS

1. Objective

To establish accepted procedures for detecting free-phase hydrocarbons and measuring groundwater levels in monitoring wells.

2. Background

Any time water levels are required to determine the groundwater flow gradient or flow direction, water levels are collected. Wells are tested for free-phase hydrocarbons prior to insertion of electronic water level probes or purge pumps the first time a well is sampled and in any well that has a history of free-phase hydrocarbons.

3. Personnel Required and Responsibilities

Project Manager: The Project Manager (PM) is responsible for ensuring that field personnel have been trained in these procedures and for verifying that water levels have been collected in compliance with this SOP.

Field Technician: The Field Technician is responsible for complying with this SOP, including determining if there are free phase hydrocarbons in the well, the thickness (if it exists) and the stabilized water level in the well.

4. Equipment Required

- Water level/free phase hydrocarbon indicator probe or pastes
- Tape measure
- Water Level Data Form/pencil
- Watch
- Disposable gloves
- Distilled water
- Alconox soap
- Containers to hold rinsate water
- Site Safety Plan and Hospital Map
- Keys to wells
- Tools to open wells

5. Procedure

After reviewing the Site Safety Plan and determining the type and concentrations of contaminants that may be present on site, the field personnel will don the proper level of personal protection prior to opening any wells.

Open all monitoring wells to be measured and remove expandable caps. Allow wells to equilibrate 5 to 15 minutes. Record time and visual observations regarding well access, condition, security, etc on water level data sheet.

5a. Alternative procedure for electronic water-level/free-phase hydrocarbon indicator

- Decontaminate probe with potable water and Alconox mix. Rinse with distilled water.
- Lower probe into the well and determine the presence of any free-phase hydrocarbons. The probe will emit a continuous sound if free product is present. If no product is present, the probe will make an oscillating (beeping) sound when it encounters water. Record the depth of free-phase hydrocarbons on the water level data sheet. If no free-phase hydrocarbons are present, record the water depth. DO NOT SUBMERGE THE PROBE THROUGH THE FLOATING PRODUCT LAYER.
- Gradient calculations shall then be performed by calculation of the groundwater elevation by:
- GW ELEV = (TOC) - (depth to water).
- TOC indicates top of casing elevation as surveyed.
- If free-phase hydrocarbons are indicated, determine the depth to water using a steel measuring tape and water indicator paste, by the procedure below.

5b. Alternative procedure for product and water indicator pastes

- Decontaminate tape measure.
- Place **product** indicator paste on bottom two feet of tape measure.
- Lower tape measure into well. Note depth to which the end of the tape is lowered relative to the point of survey mark on the top of the well casing.
- Withdraw the tape. If paste has changed color, free-phase hydrocarbons are present. Calculate depth to the floating layer by:
  - Depth to Product = (depth to which tape lowered into well) - (length of product indicator paste discoloration).
- Remove product indicator paste with paper towel and decontaminate tape measure.
- Apply **water** indicator paste on bottom two feet of tape measure.
- Lower tape into well. Note depth to which end of tape is lowered.
- Withdraw the tape. Calculate the depth to water by:
  - Depth to Water = (depth to which tape lowered into well) - (length of water indicator paste discoloration).
- Obtain the depth to groundwater level readings from the point of survey mark, or from the North side of the top of the casing, if no point of survey mark is present. Readings will be measured to the nearest 0.01 foot. Note time and readings on water level data sheet.
- Use the same measuring device to measure water levels in all wells to be used in the gradient calculation.

- Obtain depth to casing bottom for each well by submerging a tape measure until it reaches the bottom of the well. Readings will be measured to the nearest 0.01 foot. Note readings on data sheet. If sampling is not going to be completed at the site, close and lock all wells.
- Gradient calculations shall then be conducted by making water depth corrections for the presence of free product. First calculate the product thickness:
  - Product Thickness = (Depth to Water) - (Depth to Product).
  - Water elevations when free product is present shall then be calculated by:
  - GW ELEV = (TOC) - (Depth to Water) - $SG_{product}$ (Product Thickness)
  - On any site where monitoring will occur more than once, a free product sample will be collected and measured for specific gravity ($SG_{product}$). In the absence of the site specific free product specific gravity $SG_{product}$ shall be assumed to be 0.78.

WINZLER & KELLY CONSULTING ENGINEERS

STANDARD OPERATING PROCEDURES
for
MONITORING WELL PURGING AND SAMPLING ACTIVITIES

1.0 OBJECTIVE

To establish accepted procedures for the purging and sampling groundwater from monitoring wells, to ensure that representative samples of formation water are collected by accepted methods.

1.1 Background

To obtain a representative groundwater sample from monitor wells, it is necessary to remove (purge) stagnant water from within and near the well prior to sampling. In general, three to seven casing volumes must be removed from the well prior to sampling, to provide a representative sample. Wells may be sampled after purging less than the minimum three volumes if well recharge rates are beyond reasonable time constraints. The specific method of well purging will be decided on a case by case basis, or as required by project specifications.

1.2 Personnel Required and Responsibilities

Project Manager: The Project Manager (PM) is responsible for ensuring that field personnel have been trained in the use of these procedures and for verifying that monitoring well purging and sampling activities are performed in compliance with these SOP's.

Field Technician: The Field Technician is responsible for complying with these SOP's, including the purging and sampling of monitor wells, the safe containerization of extracted waters, the documentation of field procedures, and the handling of samples..

2.0 WELL PURGING ACTIVITIES

2.1 Equipment Required

- Bottom-filling bailer, suction air pump, air-lift pump, gas operated (bladder) pump, submersible pump, or other pumping device
- pH meter
- Conductivity/Temperature Meter
- Water Level Indicator
- Well Sampling Data Sheet
- Indelible marker
- Disposable gloves
- Containers to hold extracted water (as required)

2.2. Purging Procedure

Prior to groundwater sampling, each monitoring well will be purged as described below. Prior to insertion into each well, all equipment will be either decontaminated (following W&K Decontamination procedures) or will be deemed clean or previously unused by the manufacturer.

- Open all monitoring wells to be purged and allow to equilibrate 5 to 15 minutes. Record time and visual observations regarding well access, condition, security, etc. in log book.
- Obtain depth to groundwater level readings according to Winzler & Kelly Standard Operating Procedures for Groundwater Level measurements and Free Phase Hydrocarbon Measurements. Record time and readings on the Well Level Measurement Data Sheet.
- Calculate the volume of standing water in each monitoring well. Record the volume calculated for each well on the Well Sampling Data Sheet.
- Begin purging the well by removing water from the well and collecting in a calibrated container (i.e., 5-gallon bucket marked in 1-gallon increments). The depth, or interval, from which the water is being purged should be noted on the data sheet.
- Obtain readings of field parameters (pH, conductivity, temperature, and turbidity) and make visual observations of color/odor/turbidity at selected intervals (i.e., every gallon, every five gallons, etc.) throughout the purging process. Depending on the calculated volume and the expected number of gallons to be purged, a minimum of five readings should be collected. Record the time, readings, and visual comments on the Purge Data Sheet.
- Continue purging until at least three (minimum) to four well volumes have been removed and the field parameters stabilize to within:

pH	≈0.1
conductivity	≈10%
turbidity	≈10%
temperature	≈1°

  Do not exceed seven well volumes.
- Obtain a final depth to groundwater level measurement prior to collection of the groundwater sample and note the reading and time on the Well Level Measurement Data Sheet. Be sure that the measurement probe has been thoroughly decontaminated prior to insertion into each well. Note any qualitative comments regarding recharge rate of each well, and calculate the percent of the original water column that has recovered at the time of the final depth measurement. It is ideal to attain a minimum of 80% water level recovery prior to sampling, if time constraints allow. Very slow recharge rates may not allow purging the minimum three volumes or 80% recovery; lesser volumes may be used for sampling, as needed and documented.
- Collect a groundwater sample following the directions below under Section 3.0.

- Containerize all purge water and decontamination water in 55-gallon drums. Use yellow indelible markers (storeroom supply) to label all drums on the side with date, contents, origin and other pertinent information. Avoid marking the tops of drums with black marker, such marks are temporary and will soon fade/rust. Note the number, condition and location of drums on site in the field notes.

3.0 WELL SAMPLING ACTIVITIES

3.1 Equipment Required

- Disposable bailer (previously unused) *
- Bottom emptying device (sampling port)
- Monofilament nylon line (min 40-lb test)
- Monitor Well Purge & Sample Data Sheets
- Sample containers (preserved, as required) - provided by the laboratory
- Sample labels
- Indelible marker
- Disposal gloves
- Decontamination soap (Alconox)
- Distilled water for equipment decontamination.

*A variety of sampling techniques are available for the collection of groundwater samples. Except where otherwise required, W&K only utilizes disposable polyethylene bailers to collect groundwater samples.

3.2. Sampling Procedure

Prior to collecting a groundwater sample from a monitoring well, each well must be properly purged in accordance with W&K's SOP for Monitoring Well Purging Activities (See Section 2.0 above), including the measurement of the final water level and documentation of recharge.

- Water from the desired screen interval will be collected by lowering the previously unused disposable, polyethylene, bottom-filling bailer into the well.
- When bailer is completely full, carefully retract the bailer from the well casing.
- Using a previously unused, new, bottom-emptying device, to minimize agitation of the water, transfer the water from the bailer to the sample containers.
- When sampling for volatile constituents (VOA's), the water samples will be collected in 40-ml glass vials (preserved as required by the analyses requested). Precautions will be taken to prevent capturing air bubbles in the vials.
- Upon filling, each vial will be immediately capped with a Teflon septum and plastic screw cap. The vial will be checked for air bubbles by inverting and gently tapping the vial. If any bubbles are visible, the vial will be refilled and confirmed to be free of any air bubbles.

- At a minimum, all samples will be labeled with the following information:

Sample ID	Date and Time Sample Collected
Location	Sampler's Initials
Project Number	Analyses Requested

- Sample information will be documented on the Chain-of-Custody form.
  All samples will be placed in an ice chest, chilled to a temperature of 4°C. The ice chest will remain in the custody of the sampler until it is transferred to the courier service for delivery at the analytical laboratory for analyses. Any and all transfer of sample custody must be documented on the Chain-of-Custody form with the name, signature, affiliation, date and time of the persons releasing and receiving custody of the samples.
- Upon completion of the sampling activities, each well shall be closed and secured by replacing the well cap and securing the lock.
- Dispose of gloves, bailers, bottom-emptying devices, and bailing line after each use.

Appendix E
Field Notes

WINZLER & KELLY
CONSULTING ENGINEERS
633 Third Street, Eureka, CA 95501-0417
(707) 443-8326 / FAX (707) 444-8330

By CA Date 10-10-05 Client HCDPW - Loleta Sheet No. ____ of ____

Subject monitoring Job No. 01108102.011

- Loaded up the truck
- Arrived on site
- opened up the wells
- Waited for the wells to equilibrate
- Decon water meter upon arrival + between wells.
- collected water levels
- secured the wells

10-11-05

- Arrived on site
- opened up the wells
- Decon purge pump upon arrival and between wells

PW-6	11:30
MW-1	1:25
MW-3	2:27
MW-2	3:45

- began purging from cleaness to dirties
- stored purged water in drums
- stored samples in a cooler with blue ice
- Secured the area
- left the site (4:00)

PROJECT NAME: HCDPW - Loleta
PROJECT NUMBER: 0110810Z.011

TODAY'S DATE: 10-10-05
FIELD PERSONNEL: CA

WELL NUMBER	OPEN WELL	INITIAL WATER LEVEL		FINAL WATER LEVEL		COMMENTS
	Time	Time	Depth to Water (ft. bgs)	Time	Depth to Water (ft. bgs)	
PW-6	1:05		12.28			
MW-1	1:10		10.39	2.1mg/L		15.32
MW-3	1:16		12.27	2.7mg/L		20.07
MW-2	1:21		10.23	1.4mg/L		15.17
PW-7	1:27		11.74			
PW-5	1:32		11.87			
PW-3	1:37		7.12			

Weather Conditions Today: Sunni

FORMS\H20LVL

WINZLER & KELLY
Consulting Engineering

SUBJECT NAME: HCDPW - Loleta
PROJECT NUMBER: 011081102.011
WELL DESIGNATION: MW-2

PROJECT DATE: 10-11-05
SAMPLER:
SAMPLE NUMBER MW-2

CONDITION OF WELL HEAD/VAULT/CAP & LOCK
A. TOP OF CASING ELEVATION
B. DEPTH TO GROUNDWATER (initial) 10.23
C. DEPTH OF WELL MEASURED 15.17
D. HEIGHT OF WATER COLUMN (C-B) 15.17 - 10.23 = 4.94
E. GROUNDWATER ELEVATION (A-B)

CASING DIAMETER: 2"_____ 3"_____ 4"✓ OTHER_____

CALCULATED WELL VOLUME: DxV= 4.94 x .653 = 3.23 gal
A. Volume (V) of 2" wall = 0.163 gal/ft
B. Volume (V) of 4" wall = 0.653 gal/ft

ODOR yes SHEEN yes FLOATING PRODUCT THICKNESS no

PUMP TUPE: POLY BAILER_____ STAINLESS BAILER_____
ELECTRIC_____ OTHER_____

PUMP DEPTH:

TIME	GALLONS PURGED	NO. OF WELL VOLUMES	PH	TEMPERATURE (^{0}F OR ^{0}C)	CONDUCTIVITY (mmhos/cm or µmhos/cm)	TURBIDITY (NTU or visual)
11:45	2	0.62	5.84	17.0	150.5 µs/cm	cloudy
11:58	4	1.24	6.10	17.0	101.1 µs/cm	↓
12:10	6	1.86	6.17	17.0	105.9 µs/cm	↓
12:21	8	2.48	6.20	17.1	104.6 µs/cm	↓
12:33	9	2.79	6.24	17.2	104.7 µs/cm	↓
12:45	9.25	2.86	6.26	17.2	103.9 µs/cm	↓
12:57	9.50	2.94	6.29	17.3	103.3 µs/cm	↓
1:10	9.75	3.02	6.31	17.2	103.9 µs/cm	↓

RECHARGE RATE (qualitative):_____
SAMPLER TYPE: TEFLON BAILER____ ACRYLIC BAILER_____ DISPOSABLE BAILER ____

SAMPLES COLLECTER: PRESERVED VOA'S_____ UNPRESERVED VOA'S_____
PRESERVED LITERS_____ UNPRESERSERVED LITERS_____
500ml PLASTIC BOTTLE WITH PRESERVATIVE FOR METALS:
FILTERED_____ UNFILTERED_____ OTHER_____

COMMENTS_____

WINZLER & KELLY
Consulting Engineering

SUBJECT NAME: HCDPW - Loleta
PROJECT NUMBER: 011081 02.011
WELL DESIGNATION: MW-3

PROJECT DATE: 10-11-05
SAMPLER:
SAMPLE NUMBER MW-3

CONDITION OF WELL HEAD/VAULT/CAP & LOCK

A. TOP OF CASING ELEVATION
B. DEPTH TO GROUNDWATER (initial) 12.27
C. DEPTH OF WELL MEASURED 20.07
D. HEIGHT OF WATER COLUMN (C-B) 20.07 - 12.27 = 7.80
E. GROUNDWATER ELEVATION (A-B)

CASING DIAMETER: 2" ✓ 3"_____ 4"_____ OTHER_____

CALCULATED WELL VOLUME: DxV= 7.80 x .163 = 1.27 gal

A. Volume (V) of 2" wall = 0.163 gal/ft
B. Volume (V) of 4" wall = 0.653 gal/ft

ODOR no SHEEN no FLOATING PRODUCT THICKNESS no

PUMP TUPE: POLY BAILER_____ STAINLESS BAILER_____
ELECTRIC_____ OTHER_____

PUMP DEPTH:

TIME	GALLONS PURGED	NO. OF WELL VOLUMES	PH	TEMPERATURE (^{0}F OR ^{0}C)	CONDUCTIVITY (mmhos/cm or µmhos/cm)	TURBIDITY (NTU or visual)
10:00	1	0.79	5.76	15.6	83.6 µS/cm	murky
10:10	2	1.57	5.89	15.6	213 µS/cm	
10:21	3	2.36	5.87	15.8	204 µS/cm	
10:35	3.25	2.56	5.84	15.8	251 µS/cm	
10:47	3.50	2.76	5.83	15.9	88.3 µS/cm	
11:07	3.75	2.95	5.82	15.8	85.0 µS/cm	
11:20	4.0	3.15	5.82	15.8	83.3 µS/cm	

RECHARGE RATE (qualitative):_____
SAMPLER TYPE: TEFLON BAILER____ ACRYLIC BAILER_____ DISPOSABLE BAILER ____

SAMPLES COLLECTER: PRESERVED VOA'S_____ UNPRESERVED VOA'S_____
PRESERVED LITERS_____ UNPRESERSERVED LITERS_____
500ml PLASTIC BOTTLE WITH PRESERVATIVE FOR METALS:
FILTERED_____ UNFILTERED_____ OTHER_____

COMMENTS_____

WINZLER & KELLY
Consulting Engineering

SUBJECT NAME: HCDPW - Loleta
PROJECT NUMBER: 0110810Z.011
WELL DESIGNATION: MW-1

PROJECT DATE: 10-11-05
SAMPLER: CA
SAMPLE NUMBER MW-1

CONDITION OF WELL HEAD/VAULT/CAP & LOCK 10.39

A. TOP OF CASING ELEVATION
B. DEPTH TO GROUNDWATER (initial)
C. DEPTH OF WELL — MEASURED 15.32
D. HEIGHT OF WATER COLUMN (C-B) — 15.32 - 10.39 = 4.93
E. GROUNDWATER ELEVATION (A-B)

CASING DIAMETER: 2"_____ 3"_____ 4"✓ OTHER_____

CALCULATED WELL VOLUME: DxV= 4.93 X .653 = 3.22 gal

A. Volume (V) of 2" wall = 0.163 gal/ft
B. Volume (V) of 4" wall = 0.653 gal/ft

ODOR yes SHEEN no FLOATING PRODUCT THICKNESS no

PUMP TUPE: POLY BAILER_____ STAINLESS BAILER_____
ELECTRIC_____ OTHER_____

PUMP DEPTH:

TIME	GALLONS PURGED	NO. OF WELL VOLUMES	PH	TEMPERATURE (^{0}F OR ^{0}C)	CONDUCTIVITY (mmhos/cm or µmhos/cm)	TURBIDITY (NTU or visual)
8:17	2	0.62	6.94	16.6	520 us/cm	clear
8:29	4	1.24	6.64	16.7	178.1 us/cm	↓
8:41	6	1.86	6.59	16.9	87.2 us/cm	↓
8:52	8	2.48	6.41	16.8	87.6 us/cm	↓
9:05	9	2.80	6.27	16.9	85.6 us/cm	↓
9:15	9.25	2.87	6.19	16.9	85.6 us/cm	↓
9:27	9.50	2.95	6.10	17.0	85.5 us/cm	↓
9:40	9.75	3.03	6.04	17.0	84.3 us/cm	↓

RECHARGE RATE (qualitative):_____
SAMPLER TYPE: TEFLON BAILER____ ACRYLIC BAILER_____ DISPOSABLE BAILER ____

SAMPLES COLLECTER: PRESERVED VOA'S_____ UNPRESERVED VOA'S_____
PRESERVED LITERS_____ UNPRESERSERVED LITERS_____
500ml PLASTIC BOTTLE WITH PRESERVATIVE FOR METALS:
FILTERED_____ UNFILTERED_____ OTHER_____

COMMENTS_____

WINZLER & KELLY
CONSULTING ENGINEERS

DRUM INVENTORY DATA SHEET

PROJECT NAME: Loleta **TODAY'S DATE:** 10-11-05
PROJECT NUMBER: _____ **FIELD PERSONNEL:** _____

SOIL DRUMS		WATER DRUMS		EMPTY DRUMS	COMMENTS
Drum ID	How full is it?	Drum ID	How full is it?	Total #	
—	—	MW-1,2,3	Full	1	
		"	2/3	1	

Appendix F
Laboratory Analytical Reports

NORTH COAST
LABORATORIES LTD.

October 24, 2005

Winzler and Kelly
633 Third Street
Eureka, CA 95501

Attn: Paul Jones

RE: 01108102.011 HCDPW-Loleta

Order No.: 0510326
Invoice No.: 53806
PO No.:
ELAP No. 1247-Expires July 2006

SAMPLE IDENTIFICATION

Fraction	Client Sample Description
01A	PW-6
01D	PW-6
02A	MW-1
02D	MW-1
03A	MW-3
03D	MW-3
04A	MW-2
04D	MW-2

ND = Not Detected at the Reporting Limit

Limit = Reporting Limit

All solid results are expressed on a wet-weight basis unless otherwise noted.

REPORT CERTIFIED BY

Laboratory Supervisor(s) | QA Unit | Jesse G. Chaney, Jr.
Laboratory Director

5680 West End Road • Arcata California 95521-9202 • 707-822-4649 • FAX 707-822-6831

CLIENT: Winzler and Kelly
Project: 01108102.011 HCDPW-Loleta
Lab Order: 0510326

CASE NARRATIVE

TPH as Diesel:
Sample MW-2 contains some material lighter than diesel. However, some of this material extends into the diesel range of molecular weights. This sample also contains material similar to degraded or weathered diesel oil.

TPH as Gasoline:
Sample MW-2 appears to be similar to gasoline but certain peak ratios are not that of a fresh gasoline standard. The reported result represents the amount of material in the gasoline range.

Some reporting limits were raised for sample MW-2 due to matrix interference.

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Date: 24-Oct-05
WorkOrder: 0510326

ANALYTICAL REPORT

Client Sample ID: PW-6 **Received:** 10/13/05 **Collected:** 10/11/05 11:30
Lab ID: 0510326-01A

Test Name: BTEX **Reference:** EPA 5030/EPA 8021B

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
MTBE	ND	3.0	µg/L	1.0		10/21/05
Benzene	ND	0.50	µg/L	1.0		10/21/05
Toluene	ND	0.50	µg/L	1.0		10/21/05
Ethylbenzene	ND	0.50	µg/L	1.0		10/21/05
m,p-Xylene	ND	0.50	µg/L	1.0		10/21/05
o-Xylene	ND	0.50	µg/L	1.0		10/21/05
Surrogate: Cis-1,2-Dichloroethylene	94.4	85-115	% Rec	1.0		10/21/05

Test Name: TPH as Gasoline **Reference:** EPA 5030/GCFID(LUFT)/EPA 8015B

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
TPHC Gas (C6-C14)	ND	50	µg/L	1.0		10/21/05

Client Sample ID: PW-6 **Received:** 10/13/05 **Collected:** 10/11/05 11:30
Lab ID: 0510326-01D

Test Name: TPH as Diesel **Reference:** EPA 3510/GCFID(LUFT)/EPA 8015B

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
TPHC Diesel (C12-C22)	ND	50	µg/L	1.0	10/19/05	10/19/05
Surrogate: N-Tricosane	115	70-130	% Rec	1.0	10/19/05	10/19/05

Client Sample ID: MW-1 **Received:** 10/13/05 **Collected:** 10/11/05 13:25
Lab ID: 0510326-02A

Test Name: BTEX **Reference:** EPA 5030/EPA 8021B

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
MTBE	ND	3.0	µg/L	1.0		10/21/05
Benzene	ND	0.50	µg/L	1.0		10/21/05
Toluene	ND	0.50	µg/L	1.0		10/21/05
Ethylbenzene	ND	0.50	µg/L	1.0		10/21/05
m,p-Xylene	ND	0.50	µg/L	1.0		10/21/05
o-Xylene	ND	0.50	µg/L	1.0		10/21/05
Surrogate: Cis-1,2-Dichloroethylene	94.1	85-115	% Rec	1.0		10/21/05

Test Name: TPH as Gasoline **Reference:** EPA 5030/GCFID(LUFT)/EPA 8015B

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
TPHC Gas (C6-C14)	ND	50	µg/L	1.0		10/21/05

NORTH COAST LABORATORIES
5680 West End Road • Arcata, California 95521-9202 • 707-822-4649 • FAX 707-822-6831

Date: 24-Oct-05
WorkOrder: 0510326

ANALYTICAL REPORT

Client Sample ID: MW-1 **Received:** 10/13/05 **Collected:** 10/11/05 13:25
Lab ID: 0510326-02D

Test Name: TPH as Diesel **Reference:** EPA 3510/GCFID(LUFT)/EPA 8015B

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
TPHC Diesel (C12-C22)	ND	50	µg/L	1.0	10/19/05	10/19/05
Surrogate: N-Tricosane	117	70-130	% Rec	1.0	10/19/05	10/19/05

Client Sample ID: MW-3 **Received:** 10/13/05 **Collected:** 10/11/05 14:27
Lab ID: 0510326-03A

Test Name: BTEX **Reference:** EPA 5030/EPA 8021B

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
MTBE	ND	3.0	µg/L	1.0		10/21/05
Benzene	ND	0.50	µg/L	1.0		10/21/05
Toluene	ND	0.50	µg/L	1.0		10/21/05
Ethylbenzene	ND	0.50	µg/L	1.0		10/21/05
m,p-Xylene	ND	0.50	µg/L	1.0		10/21/05
o-Xylene	ND	0.50	µg/L	1.0		10/21/05
Surrogate: Cis-1,2-Dichloroethylene	88.9	85-115	% Rec	1.0		10/21/05

Test Name: TPH as Gasoline **Reference:** EPA 5030/GCFID(LUFT)/EPA 8015B

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
TPHC Gas (C6-C14)	ND	50	µg/L	1.0		10/21/05

Client Sample ID: MW-3 **Received:** 10/13/05 **Collected:** 10/11/05 14:27
Lab ID: 0510326-03D

Test Name: TPH as Diesel **Reference:** EPA 3510/GCFID(LUFT)/EPA 8015B

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
TPHC Diesel (C12-C22)	ND	50	µg/L	1.0	10/19/05	10/19/05
Surrogate: N-Tricosane	95.1	70-130	% Rec	1.0	10/19/05	10/19/05

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Date: 24-Oct-05
WorkOrder: 0510326

ANALYTICAL REPORT

Client Sample ID: MW-2 **Received:** 10/13/05 **Collected:** 10/11/05 15:45
Lab ID: 0510326-04A

Test Name: BTEX **Reference:** EPA 5030/EPA 8021B

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
MTBE	ND	9.0	µg/L	1.0		10/21/05
Benzene	24	5.0	µg/L	10		10/21/05
Toluene	9.1	0.50	µg/L	1.0		10/21/05
Ethylbenzene	6.4	0.50	µg/L	1.0		10/21/05
m,p-Xylene	11	0.50	µg/L	1.0		10/21/05
o-Xylene	1.2	0.50	µg/L	1.0		10/21/05
Surrogate: Cis-1,2-Dichloroethylene	93.9	85-115	% Rec	10		10/21/05

Test Name: TPH as Gasoline **Reference:** EPA 5030/GCFID(LUFT)/EPA 8015B

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
TPHC Gas (C6-C14)	720	50	µg/L	1.0		10/21/05

Client Sample ID: MW-2 **Received:** 10/13/05 **Collected:** 10/11/05 15:45
Lab ID: 0510326-04D

Test Name: TPH as Diesel **Reference:** EPA 3510/GCFID(LUFT)/EPA 8015B

Parameter	Result	Limit	Units	DF	Extracted	Analyzed
TPHC Diesel (C12-C22)	610	50	µg/L	1.0	10/19/05	10/19/05
Surrogate: N-Tricosane	114	70-130	% Rec	1.0	10/19/05	10/19/05

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5680 West End Road • Arcata, California 95521-9202 • 707-822-4649 • FAX 707-822-6831

North Coast Laboratories, Ltd.

Date: 24-Oct-05

CLIENT: Winzler and Kelly
Work Order: 0510326
Project: 01108102.011 HCDPW-Loleta

QC SUMMARY REPORT
Method Blank

Sample ID: **MB-10/20/05** Batch ID: **R37578** Test Code: **BTXEW** Units: **µg/L** Analysis Date **10/21/05 12:16:59 AM** Prep Date:
Client ID: Run ID: **ORGC8_051020B** SeqNo: **541326**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
MTBE	ND	3.0									
Benzene	ND	0.50									
Toluene	0.1274	0.50									J
Ethylbenzene	ND	0.50									
m,p-Xylene	0.2525	0.50									J
o-Xylene	ND	0.50									
Cis-1,2-Dichloroethylene	0.917	0.10	1.00	0	91.7%	85	115	0			

Sample ID: **MB-10/20/05** Batch ID: **R37577** Test Code: **TPHCGW** Units: **µg/L** Analysis Date **10/21/05 12:16:59 AM** Prep Date:
Client ID: Run ID: **ORGC8_051020A** SeqNo: **541308**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
TPHC Gas (C6-C14)	ND	50									

Sample ID: **MB-14447** Batch ID: **14447** Test Code: **TPHDIW** Units: **µg/L** Analysis Date **10/19/05 3:03:52 PM** Prep Date: **10/19/05**
Client ID: Run ID: **ORGC7_051019B** SeqNo: **540931**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
TPHC Diesel (C12-C22)	ND	50									
N-Tricosane	51.7	0.10	50.0	0	103%	70	130	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

North Coast Laboratories, Ltd.

Date: 24-Oct-05

CLIENT: Winzler and Kelly
Work Order: 0510326
Project: 01108102.011 HCDPW-Loleta

QC SUMMARY REPORT
Laboratory Control Spike

Sample ID: **LCS-05679** Batch ID: **R37578** Test Code: **BTXEW** Units: **µg/L** Analysis Date **10/20/05 9:23:25 PM** Prep Date:
Client ID: Run ID: **ORGC8_051020B** SeqNo: **541324**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
MTBE	39.71	3.0	40.0	0	99.3%	85	115	0			
Benzene	5.029	0.50	5.00	0	101%	85	115	0			
Toluene	5.122	0.50	5.00	0	102%	85	115	0			
Ethylbenzene	4.954	0.50	5.00	0	99.1%	85	115	0			
m,p-Xylene	9.817	0.50	10.0	0	98.2%	85	115	0			
o-Xylene	4.943	0.50	5.00	0	98.9%	85	115	0			
Cis-1,2-Dichloroethylene	1.11	0.10	1.00	0	111%	85	115	0			

Sample ID: **LCSD-05679** Batch ID: **R37578** Test Code: **BTXEW** Units: **µg/L** Analysis Date **10/21/05 6:03:05 AM** Prep Date:
Client ID: Run ID: **ORGC8_051020B** SeqNo: **541334**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
MTBE	37.14	3.0	40.0	0	92.8%	85	115	39.7	6.70%	15	
Benzene	4.817	0.50	5.00	0	96.3%	85	115	5.03	4.31%	15	
Toluene	4.842	0.50	5.00	0	96.8%	85	115	5.12	5.62%	15	
Ethylbenzene	4.754	0.50	5.00	0	95.1%	85	115	4.95	4.11%	15	
m,p-Xylene	9.484	0.50	10.0	0	94.8%	85	115	9.82	3.45%	15	
o-Xylene	4.740	0.50	5.00	0	94.8%	85	115	4.94	4.21%	15	
Cis-1,2-Dichloroethylene	1.04	0.10	1.00	0	104%	85	115	1.11	7.06%	15	

Sample ID: **LCS-05680** Batch ID: **R37577** Test Code: **TPHCGW** Units: **µg/L** Analysis Date **10/20/05 10:32:52 PM** Prep Date:
Client ID: Run ID: **ORGC8_051020A** SeqNo: **541306**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
TPHC Gas (C6-C14)	463.9	50	500	0	92.8%	85	115	0			

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

CLIENT: Winzler and Kelly
Work Order: 0510326
Project: 01108102.011 HCDPW-Loleta

QC SUMMARY REPORT
Laboratory Control Spike Duplicate

Sample ID: **LCSD-05680** Batch ID: **R37577** Test Code: **TPHCGW** Units: **µg/L** Analysis Date **10/21/05 6:37:37 AM** Prep Date:
Client ID: Run ID: **ORGC8_051020A** SeqNo: **541316**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
TPHC Gas (C6-C14)	463.6	50	500	0	92.7%	85	115	464	0.0599%	15	

Sample ID: **LCS-14447** Batch ID: **14447** Test Code: **TPHDIW** Units: **µg/L** Analysis Date **10/19/05 1:00:20 PM** Prep Date: **10/19/05**
Client ID: Run ID: **ORGC7_051019B** SeqNo: **540928**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
TPHC Diesel (C12-C22)	498.1	50	500	0	99.6%	67	120	0			
N-Tricosane	58.7	0.10	50.0	0	117%	70	130	0			

Sample ID: **LCSD-14447** Batch ID: **14447** Test Code: **TPHDIW** Units: **µg/L** Analysis Date **10/19/05 1:20:37 PM** Prep Date: **10/19/05**
Client ID: Run ID: **ORGC7_051019B** SeqNo: **540929**

Analyte	Result	Limit	SPK value	SPK Ref Val	% Rec	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
TPHC Diesel (C12-C22)	544.0	50	500	0	109%	67	120	498	8.81%	15	
N-Tricosane	63.0	0.10	50.0	0	126%	70	130	58.7	7.15%	15	

Qualifiers:
ND - Not Detected at the Reporting Limit
J - Analyte detected below quantitation limits
S - Spike Recovery outside accepted recovery limits
R - RPD outside accepted recovery limits
B - Analyte detected in the associated Method Blank

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Chain of Custody

10/13/05
004 08

LABORATORY NUMBER: 0510328

Attention: Paul Jones
Results & Invoice to: Winzler + Kelly
Address: 633 Third St
Eureka, CA 95501
Phone: 443-8326
Copies of Report to:

Sampler (Sign & Print): C. Acu

PROJECT INFORMATION

Project Number: 01108102.011
Project Name: HCDPW-Loleta
Purchase Order Number:

TAT: ☐ 24 Hr ☐ 48 Hr ☐ 5 Day ☐ 5–7 Day
☑ STD (2–3 Wk) ☐ Other:
PRIOR AUTHORIZATION IS REQUIRED FOR RUSHES

REPORTING REQUIREMENTS: State Forms ☐
Preliminary: FAX ☐ Verbal ☐ By: / /
Final Report: FAX ☐ Verbal ☐ By: / /

CONTAINER CODES: 1—½ gal. pl; 2—250 ml pl; 3—500 ml pl; 4—1 L Nalgene; 5—250 ml BG; 6—500 ml BG; 7—1 L BG; 8—1 L cg; 9—40 ml VOA; 10—125 ml VOA; 11—4 oz glass jar; 12—8 oz glass jar; 13—brass tube; 14—other

PRESERVATIVE CODES: a—HNO_3; b—HCl; c—H_2SO_4; d—$Na_2S_2O_3$; e—NaOH; f—$C_2H_3O_2Cl$; g—other

LAB ID	SAMPLE ID	DATE	TIME	MATRIX*		TPH-G/BTEX (8021B)	TPH-D	TPH-G/BTEX/Oxygenates (8021B)	no Oxys DC Paul 10/14
	PW-6	10-11-05	11:30		5	X	X		
	MW-1	↓	1:25		5	X	X		
	MW-3	↓	2:27		5	X	X		
	MW-2	↓	3:45		5	X	X		
	QCTB				1			X	

SAMPLE CONDITION/SPECIAL INSTRUCTIONS

If any samples contains non-detectable concentration of all analytes except TPH-D, The TB should not be analyzed

Report in EDF - Global ID To 602300113

Cooler Temp 4.9°

RELINQUISHED BY (Sign & Print)	DATE/TIME	RECEIVED BY (Sign)	DATE/TIME
Carlos Acu	10-13-05	[signature] 10/13	05 1400

SAMPLE DISPOSAL
☐ NCL Disposal of Non-Contaminated
☐ Return ☐ Pickup

CHAIN OF CUSTODY SEALS Y/N/NA
SHIPPED VIA: UPS Air-Ex Fed-Ex Bus Hand

***MATRIX:** DW=Drinking Water; Eff=Effluent; Inf=Influent; SW=Surface Water; GW=Ground Water; S=Soil; O=Other.

ALL CONTAMINATED NON-AQUEOUS SAMPLES WILL BE RETURNED TO CLIENT